

United States Department of Agriculture,

DIVISION OF POMOLOGY.

PRUNE CULTURE IN THE PACIFIC NORTHWEST.By E. R. LAKE, *Oregon*

Prune culture in the Pacific Northwest is comparatively a new industry. The prune, though grown here since pioneer days in the fifties, has only within the past decade become a fruit of commercial importance in this section. For twenty years or more following its introduction it had no rank as a commercial crop. Since the early eighties, however, it has been put upon the market in noticeable quantities, and since 1890 it has become of considerable value. The income from the output this year is probably not far from \$250,000. Next year the output will be much heavier, and it promises to steadily increase year by year until the large number of young orchards, covering a wide area and now just under bearing age, come into full bearing.

Last July the Rural Northwest, a very conservative authority, in speaking of the importance of the industry to this section, after reviewing over five hundred very full reports, said:

It appears from the reports which have been made to this paper that there are now about 40,000 acres of prune orchards in the three States [Oregon, Washington, and Idaho]. The investment already made in this industry can not fall far short of \$6,000,000, and by the time all these orchards have come into bearing the amount of the investment will have reached \$10,000,000. The cost of the evaporators needed to cure the prunes grown on this acreage will not be less than \$2,000,000, and \$500,000 more will be required to buy the graders which must be used before and after curing the fruit. This makes a total investment of at least \$12,500,000 before the present area of orchards will be fully equipped. In the meantime the area of young plantings is being largely increased, and it is not unsafe to say that \$20,000,000 will be invested in this industry by the close of 1899.

In the single planting season of 1888-89 more acres were set out to prunes than had been put out altogether from the date of introduction till that time.

The explanation of this sudden development of the prune industry lies chiefly in the facts that our soil and climate are particularly favorable to the development of this fruit, and that prices have been such as to make it exceedingly profitable. As high as 18 cents per pound have been netted for small quantities of prunes, and not infrequently carload lots have netted the growers 10 cents, 11 cents, and 12 cents per pound. But during the past year prices have fallen to as low as 4 cents, though the general crop has been sold for 5 cents or more; and even at these prices, with best modern methods and good management in both orchard and evaporator, this is a profitable crop.

The first commercial prune orchards of this section were planted near Portland, Oreg., and Vancouver, Wash., two cities lying only 6 miles apart, but on opposite sides of the beautiful Columbia. Vancouver is located in Clarke County, and this is the center of prune culture in Washington. Douglas County is the banner county for prunes in Oregon, though Yamhill is a close second. Walla-

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walla Valley has a large area of young orchards and will in the near future market large quantities of this fruit.

While the sections above enumerated are the leading centers of the industry at present, there are several other points at which it is becoming important. In Oregon, Ashland, Grants Pass, Eugene, Corvallis, Salem, Oregon City, and Milton are the local centers of large plantings which will begin bearing next year, as well as of some that are already bearing. In Washington, Olympia, San Juan Island, Yakima, and the Snake River Canyon are other points at which young bearing orchards are to be found.

At all these points the soil and climatic conditions are peculiarly suited to the growth of the prune. Western Oregon and Washington have a uniformly fertile soil. It is largely basaltic loam, resembling in appearance the soil of the "oak openings" and prairies of southern Michigan and parts of Indiana. In southern Oregon much of the soil is of granitic origin, the surface soil in many places being composed of irregular, broken, half decomposed particles of granite. In parts of this general territory west of the Cascade Mountains the basalt is so deep as to make it necessary to underdrain, while in much larger parts abundant drainage is furnished through a gravelly subsoil. Along the foothills and on the ridges skirting the numerous small valleys much of the soil is a red clay, and is admirable orchard land. The shot clays (soils made up of small reddish brown or black clay pellets) of some sections are held in high esteem for prunes.

In the eastern part of both States the soil is very variable, ranging from light drifting sands to heavy clays. An intermediate soil, locally called volcanic ash, is a favorite one for prune growing. Usually, however, orchards in the eastern part of these States must be irrigated, which is also the case in Idaho.

Commercially we have three prunes: Italian, Petite (Prune of Agen), and Silver (Coe Golden Drop). Other varieties, and there are several being tested and cultivated in small quantities, are classed with one of the three above according to size and color. Black ones, if large, are classed with Italian; rosy ones, with Petite; light-colored ones, if large, with Silver. Prunes which do not naturally fall into one or another of these classes are not readily salable. The Italian is the first choice in this section, though the Petite is a more regular and prolific bearer. The peculiar plum flavor of the Italian, coupled with its large size, secures for it a ready sale at 12½ cents per pound for the dried product—higher than the Petite; hence it is a more desirable prune for growing in this section, though the Willamette, a new prune here, appears on first test to have all the desirable qualities of the Italian besides a few of its own. The Petite is the leading prune of California; hence with the Italian we do not come into competition with our neighbor, a point of some importance in the consideration of varieties for planting here.

In the matter of selecting orchard sites much latitude is allowed individual taste. If care is used and a site selected where the soil is deep and well drained, little difficulty will be experienced in growing a good prune orchard in any of the sections above mentioned. Since all our prunes are propagated on peach stock, and as this stock is averse to wet, heavy soils, it is necessary to look carefully to the drainage, surface, and subsoil of the orchard site. Usually hill land is preferred, though river bars, ridges of red soil, and high "fern land" are equally acceptable if the latter have good bottom drainage. While the more level valley and bottom land is not usually used for orchard purposes, it is, under proper treatment, excellent for this purpose. Some of the most vigorous and productive small orchards in this region are on low valley land, but it is thoroughly tiled.

For several years past our leading horticulturists have advised the most thorough preparation of the soil before planting. They have recommended deep

surface plowing, subsoiling, tile draining, and, in truth, everything which would tend to put the soil in the best possible condition for the reception of the trees. But planters are slow to adopt thorough tillage measures, and, generally speaking, the ground is given an ordinary plowing and harrowing and the trees set out. Not infrequently in the timbered sections the trees are set out before the stumps of the forest monarchs are all removed. This practice can not be countenanced, as deep tillage before planting is of much importance.

The operation of planting is usually performed in the spring, though in open winters trees may be planted at any time from November 1 to April 1. Yearling trees are used altogether now, planters finding them cheaper, more easily handled, more suitable for uniformity in heading, and quicker to recover from the shock of transplanting. A first-class yearling prune tree—none other should be planted—will be from 7 to 10 feet in height, one single shoot, and $\frac{3}{4}$ to 1 $\frac{1}{2}$ inches in diameter. After the tree is planted it should be cut back to within 18 to 30 inches from the ground (fig. 1). This operation is called "heading back," and this practice determines the suitability of the one-year-old single shoots, for with such a tree the head can be started at any desired height.

In the older orchards trees were planted 16 $\frac{1}{2}$ feet apart each way—160 to the acre. Later plantings have been made 18 and 20 feet apart, with much better results. A prune tree on anything but the thinnest of soil needs more than a "rod square." Nearly all plantings are made on squares, though a few orchards are planted on the quincunx plan.

Formerly trees were headed back to about 4 feet. At present they are commonly headed back to 2 feet, while 18 inches is not uncommon in the warmer and drier sections. The objections formerly urged against low heading to the effect that tillage operations could not be so well performed, have been met in the tillage of the younger orchards. A team properly handled will do no more damage to a tree headed low than to one headed high; the soil can be as fully and thoroughly tilled in an orchard of low tops as in one of high tops; pruning is much more easily performed; less damage is done to fruit by bruising in the fall to the ground, and with fruit to be shipped to distant markets in fresh condition the saving over the cost in picking from high tops is a considerable item.

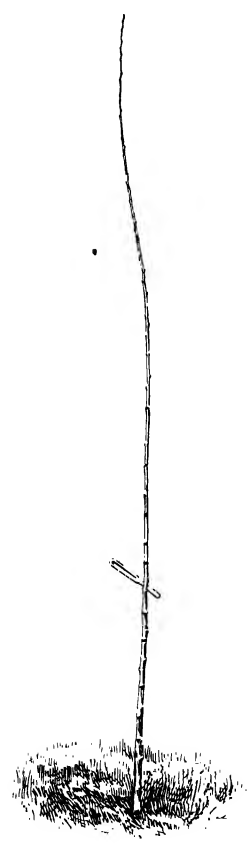


FIG. 1.—Yearling prune tree with knife inserted at point at which it should be cut back—18 to 20 inches from the ground.

The first year after transplanting the young tree is allowed to push out three or four branches, care being exercised that they do not issue from a common point on the trunk. These shoots are cut back one-half or two-thirds during the following winter. The second year each one of these branches is allowed to push out from two to four shoots. At the next pruning these are thinned out and cut back to correspond with the style of tree to be grown and the extent of growth made. The winter following the third growing season will witness a repetition of the pruning operations of the previous year. The fourth year some fruit may be produced, and from this time on less annual pruning is required until in the seventh or eighth year little else than thinning out injured, crossed, or intractable branches will be needed. (Fig. 2.)

Clean cultivation is the universal practice in all young orchards and many old ones. One crop at a time is the motto of the prune grower. In the spring one principal plowing to the depth of 5 or 6 inches is given, and usually this is followed by a cross plowing of somewhat less depth. From the time this work is finished till the middle of July harrows or cultivators are kept constantly working over the surface soil. In orchards where ferns infest the land one of several devices called "fern killers" is drawn over the ground as often as the young

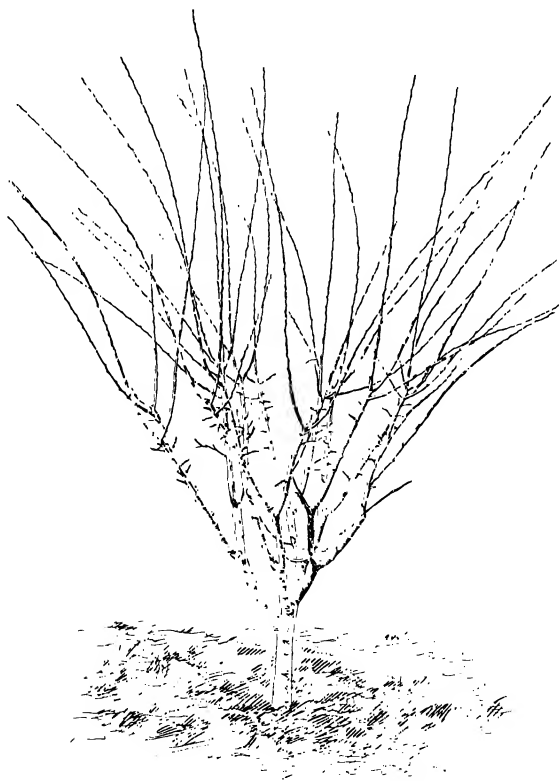


FIG. 2.--A model prune tree of the vase form.

ferns show above the surface. This constant stirring of the soil conserves the moisture to such an extent that trees are kept vigorously growing through our longest dry seasons. Without such working the active growing season of the trees is shortened: they begin in consequence to bear earlier, and this is followed often by the early breaking down of the tree's constitution.

All over our prune-growing sections may be seen examples of this early neglect of thorough tillage, in orchards now old and broken-down which should still be in their prime. Still many of our small home makers grow annual vegetables and strawberries among the trees for the first four years, and when good judgment is used in the tillage of such crops little if any check is given to the trees. But the growing of bush fruits, raspberries and blackberries in particular, does serious injury in a young orchard by checking and stunting the growth of the trees. The same may be said of the fern: if allowed to grow quite unmolested it works havoc to the trees. An instance in mind gives the plainest possible evidence that five-year-old trees among a dense growth of fern have made less growth than three-year-old trees in similar soil and under similar treatment with

the fern removed. The explanation is easy. These bush fruits and the fern take all the moisture from the soil just when the trees most need it, and the result is a premature ripening of the wood of the trees and a cessation of growth before the season is much more than half gone. Another reason why the prune orchard should be clean tilled is that it facilitates the picking up of the fruit.

For drying the prune should be fully ripe. The riper it is without being rotten the better. With the process of ripening comes the formation of fruit sugar, the especial element desired in this product. As soon as the fruit begins to leave the stem freely and fall to the ground the evaporators are started. Boys are usually employed to pick up the fruit and are paid at the rate of 5 cents per bushel. None but fully ripened fruit is permitted to be gathered. The boys are not allowed to shake the trees, though a light shake or jar is sometimes given by a person assigned to this particular task. Green or partly ripened fruit makes a very inferior—in fact, a nonmarketable product—and it is to avoid this loss that great care is exercised in gathering only fully ripened fruit. Some orchardists allow the fruit to lie on the ground several days after it has fallen or been shaken off before gathering it, holding that this mellows and “sugars” the fruit; certain it is this fully ripened or even overripened fruit always gives the best returns in the dried product. Boxes holding from 50 to 60 pounds are used exclusively for the gathering of the fruit.

Upon delivery at the evaporator the fruit is passed over a grader, which separates it into four or five grades and at the same time removes all leaves and other rubbish. From the grader the fruit is placed in bins, each grade separately, where it may be allowed to remain one or two days in which to further mature or mellow. When ready for evaporation the fruit is taken from the bins in baskets or pails (holding about one-third or one-fourth of a bushel, and made of some perforated metal or wire) and “dipped,” rinsed, placed upon trays, and put into the evaporating chamber.

There is a diversity of practice in the matter of “dipping.” Some of our growers dip Italian and not Petite, others practice the reverse, while still others dip neither. Dipping consists in immersing the fruit for from one to three seconds in a boiling solution of lye. It is claimed by the advocates of dipping that the fruit dries more quickly and consequently the expense of evaporating is lessened; those who do not dip claim that the product from undipped fruit looks enough better to more than offset the extra expense in drying, being more marketable. However this may be, for as yet no adequate experiments have been made to ascertain the truth, it is certain that no brighter, rosier, livelier lot of evaporated fruit has ever gone to the market from this section than has been cured here this year without dipping.

As practiced here the dipping process is about as follows: A large caldron kettle, holding perhaps 60 gallons, half or two-thirds full of water, in which concentrated lye has been dissolved in the proportion of 1 pound of lye to 12 gallons of water is put over the fire, the water brought to boiling point and kept there while the dipping progresses. A basketful of fruit is immersed in this solution, given a swirl, and removed. The object is to bring every part of the prune in contact with the hot lye water. If the work is thoroughly done the skin of the fruit will present, on removal, a blistered appearance, which is accompanied by numerous minute scratches. From the lye water the prunes are taken to tubs of pure, clean water, where the dipping is repeated even more thoroughly than before in order to rise off all traces of lye from the fruit. Even if dipping is not practiced this rinsing is just as necessary for the removal of dirt and other foreign matter that may adhere to the fruit. All fruit is therefore washed before going into the trays. On being taken from this second bath the fruit is dumped on trays, spread uniformly, and the trays either tiered up in readiness

for the evaporation chamber or put in at once. During these various steps in the process of evaporation the different grades of fruit, as determined by the grader, are kept separate—that is, only fruit of one size is placed upon a single tray. This allows of a uniformity in the evaporation of each tray, a very desirable condition. The point at which evaporation shall be stopped is one of great importance and at the same time one that is imperfectly understood. The essential point is to secure as “meaty” a product as possible and at the same time one that will not mold or sour when subjected to variable climatic conditions. Drying too hard not only greatly lessens the weight of the total product to the grower but it injures the quality, while drying it too little may result in great loss through fermentation and molding. A fruit that is just right will be, when cold from the evaporator, bright, elastic, yielding to the touch, and when stirred in bulk must “crawl.” This latter condition must be seen to be fully understood, as no word or words will better describe it than “crawl.”

The evaporator in most general use is one evolved out of the experience of the past decade, and though far from perfect, has been the groundwork for some recently improved patented evaporators that are doing excellent work (fig. 3.)

The chief point aimed at in the old-style drier was to create a current of air which should pass through or over a large amount of fruit. To accomplish this, recourse was had to an arched brick furnace with double return flues placed several feet beneath the evaporating chamber, which is an ordinary closed room with numerous small doors opening into it, one above another in tiers, from the sides. Through these doors the fruit is introduced on trays, the tiers of trays being quite regularly distributed throughout the chamber or room on a series of cleated supports. For a current of air dependence has been placed on natural conditions—heated air rises. To increase the current one must increase the heat, but above 180° F., or thereabouts, it is injurious to the texture of the fruit. Under the present practice twenty to twenty-four hours is found to be the average period of time for drying. This is altogether too slow where great quantities are to be handled, and our foremost growers are looking to the introduction of some system of forced-air currents for quicker results. One improved evaporator permits the removing of cured fruit from any part of the chamber at any time and its replacement by green fruit. This is a great advance over the style in general use, which requires that the fresh fruit be placed in the bottom tiers and that, as it cures, it be raised gradually, one or two spaces at a time to the top-most tier, where it remains till finally cured. As the bottom trays are moved up their places are filled by fresh ones, and so the process goes on, involving endless labor. One or two steam-heated evaporators are doing excellent work, but their cost is yet too great for the average orchardist.

After the trays are removed from the evaporator the fruit is placed in bins, where, with occasional turnings, it is allowed to remain two or three weeks or more. This is the sweating process. Fruit properly cured will have, on removal from the evaporator, a stiff, doughy, or leathery consistency, but with the present evaporators some fruit on each tray will, in spite of the utmost care, be either too much or too little cured. In the sweating bins this fruit all becomes homogeneous, the quality, so far as appearances go, becomes uniform, and the right consistency for market is obtained. Good fruit in the sweating bin will “crawl” when stirred; fruit dried too much will rattle; fruit dried too little will be soggy. When the sweating is completed, the fruit is taken out of the bins, passed over and a grader, being graded to sizes, as 30s to 40s, 40s to 50s, and so on to 100s to 110s, or even a grade or two higher. These grades indicate the number of dried prunes to a pound. The price varies usually one-eighth cent per size. If 30s to 40s are selling for 8 cents, 40s to 50s would sell for $7\frac{1}{2}$ cents,

and so on down the scale. The Italian will usually average four to five grades higher than the Petite, while the Silver will generally go a little over the Italian.

From this latter grading the fruit is packed in boxes of 25 to 50 pounds, or sacked in cheap cotton sacks holding 50 pounds each. Often the grower sells

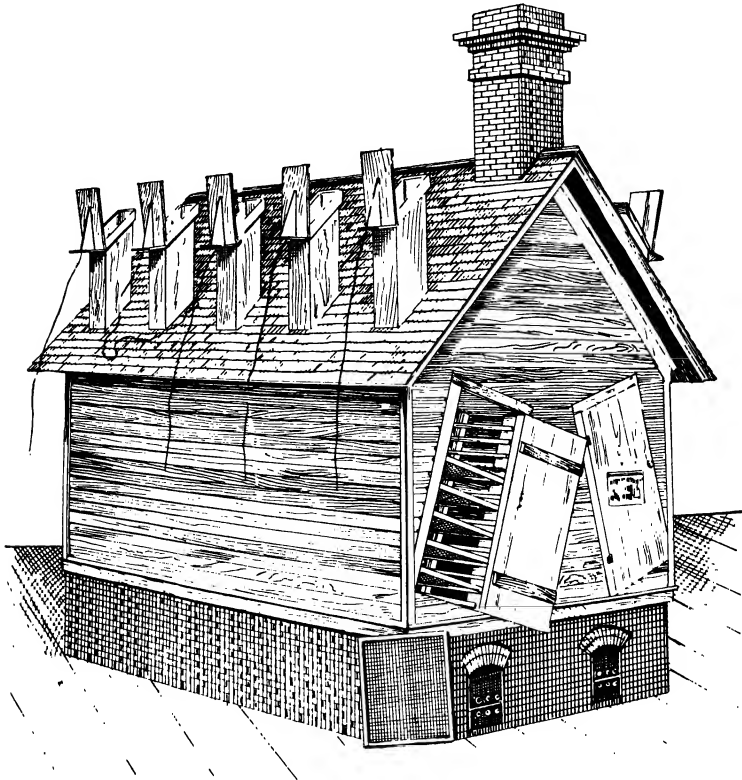


FIG. 3.—Improved patent prune evaporator.

direct from the evaporator to the commission man, the latter doing the grading and packing at his own warehouse, the fruit being carried from the orchard in ordinary grain sacks.

In the matter of putting up prunes in fancy packages little has been done. Prices have been so good on the general crop that there has been little inducement to attempt fancy packing; however, with lower prices it is likely that something will be done by our more progressive growers in this direction.

A still more important step in the industry is the erection and efficient management of larger evaporating plants. There is at present such a wide range in the quality of our dried prunes that it is next to impossible to establish a definite grade or class for our fruit on the market, and in consequence we lose, on the whole, a large margin that always goes to "established brands." This we expect to overcome in the establishment and maintenance of large evaporating plants, from which the product would necessarily be much more uniform than at present.

With a decade of experience back of us, the promise of newer and better methods, and prospects for the future brighter than ever, we expect that in the next decade our prune product will be firmly established on the markets and we will then reap the reward due to merit.